

## 2.1 Travel Time Studies

Travel time is the elapsed time it takes for a vehicle to traverse a given segment of a street. Travel time studies provide the necessary data to determine the average travel time. Combined with the length of the corridor under study, this data can be used to produce average travel speed. Travel time and delay are two of the principal measures of roadway system performance used by traffic engineers, planners and analysts. Since vehicle speed is directly related to travel time and delay, it is also an appropriate measure-of-performance to evaluate traffic systems.

Travel time studies were conducted noting the sources and amount of delay occurring within the study corridor. Each of the study corridors were divided into several “links”, which were defined by signalized intersections or signalized pedestrian crosswalks. The boundaries of these links were identified as the far-side curb of the intersection, or just beyond each of the signalized locations. Therefore, delay for a particular intersection was included in the total delay of the link ending at that intersection.

The Institute of Transportation Engineers’ (ITE) *Manual of Traffic Engineering Studies* recommends that the comparison of “before” and “after” studies have a range of permitted error of  $\pm 1$  to  $\pm 3$  mph. ITE also recommends using the average range in running speed (i.e., the average speed of a vehicle traveling over a predetermined speed) to determine the minimum number of individual runs necessary to achieve an acceptable range of error. This accepted methodology predicts that with eight (8) separate runs, and a maximum average range in running speed of 5.0 mph, a confidence level of 95% is achieved, with a permitted error of  $\pm 1$  mph. Therefore, a minimum of eight runs were conducted for each corridor, during each time period and in each direction for both the “before” and “after” conditions.

Travel time studies were conducted for each of the study corridors during the AM Peak (7:00-8:30 a.m.), Midday (11:00 a.m.–1:00 p.m.) and PM Peak (4:00-6:00 p.m.) time periods. In addition, all travel time studies were conducted on days that are representative of Lincoln’s average traffic day. These are days with dry and clear weather conditions, all schools and universities in session and no special events (e.g., State Fair, state high school athletic tournaments, Fridays before home Nebraska football games) are taking place.

Travel time data was collected using equipment manufactured by Jamar Technologies, Inc. and connected to a 2000 Chevrolet Malibu. Using sensors attached to the vehicle’s transmission, electronic pulses are converted to units of distance and sent to a hand-held electronic data collection device (TDC-8) that records the information in one-second intervals. A software package, PC-TRAVEL, was then used to analyze the data, including calculating total travel time, average speed, total delay, fuel consumption and vehicle emissions. Additional statistical computations were performed by TSA to determine standard deviations and confidence intervals.